CATALOG DOCUMENTATION
REGIONAL ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM - REGION 10
1994-1995 WASHINGTON/OREGON COASTAL STREAMS AND YAKIMA RIVER BASIN STREAMS
SHORT LIST OF BEST PHYSICAL HABITAT METRICS DATA

TABLE OF CONTENTS

1.   DATA SET IDENTIFICATION

1.1 Title of Catalog Document

Regional Environmental Monitoring and Assessment Program - Region 10
1994-1995 Washington/Oregon Coastal Streams and Yakima Basin Streams
Short List of Best Physical Habitat Metrics Data Set

1.2 Authors of the Catalog Entry

U.S. EPA NHEERL Western Ecology Division
Corvallis, OR

1.3 Catalog Revision Date

23 March 1999

1.4 Data Set Name

HABBEST

1.5 Task Group

Region 10

1.6 Data Set Identification Code

00002

1.7 Version

001

1.8 Requested Acknowledgment

These data were produced as part of the U.S. EPA's Environmental
Monitoring and Assessment Program (EMAP). If you publish these data or
use them for analyses in publication, EPA requires a standard statement
for work it has supported:

"Although the data described in this article have been funded wholly or
in part by the U. S. Environmental Protection Agency through its
Regional EMAP program, it has not been subjected to Agency review,
and therefore does not necessarily reflect the views of the Agency and
no official endorsement should be inferred."

2.   INVESTIGATOR INFORMATION

2.1 Principal Investigators

Gretchen Hayslip
U.S. EPA Region 10

Glenn Merritt
Washington State Department of Ecology

Rick Hafele
Oregon Department of Environmental Quality

2.2 Investigation Participant - Sample Collection

U.S. Environmental Protection Agency
   Office of Research and Development
   Region 10
Oregon Department of Environmental Quality
Washington State Department of Ecology
Oregon State University
University of Washington
Yakama Indian Nation Environmental Protection Program

3.   DATA SET ABSTRACT

3.1 Abstract of the Data Set

The HABBEST data set contains a selected subset of metrics calculated
from the raw physical habitat data collected at each stream sampled.

3.2 Keywords for the Data Set

habitat, cover, large woody debris, pools, riffles, residual pools,
instream cover, riparian habitat, riparian zone

4. OBJECTIVES AND INTRODUCTION

4.1 Program and Project Objectives

4.1.1 Program Objective

The Regional Environmental Assessment and Monitoring Program (R-EMAP) was initiated to test the applicability of the EMAP approach to answer questions about ecological conditions at regional and local scales. Using EMAP's statistical design and indicator concepts, R-EMAP conducts projects at smaller geographic scales and in shorter time frames.

4.1.2 Project Objective

The objectives of Region 10 1994-1995 Washington/Oregon Coastal Streams and Yakima Basin Streams R-EMAP project were to:

1. Determine the ecological condition of wadeable, 1st-order through 3rd-order streams of the Coast Range Ecoregion and the Yakima River Basin (Columbia Basin Ecoregion).
2. Determine the relationship between the ecological condition of these streams and the predominant land used of the watersheds.
3. Provide the states of Washington and Oregon with information that would assist in the development of water quality biological criteria using indices based on fish/amphibian and invertebrate taxa assemblage information.
4. Determine the applicability of EMAP-derived methods for assessments of ecological condition within streams in the states of Washington and Oregon.

4.2 Data Set Objective

The primary function of the stream habitat data set is to describe the physical habitat quality within the stream and near-shore riparian zone. This information is used to help establish the "expectations" of the biological quality of the stream and to evaluate the extent to which human activity has disturbed habitat and thus impacted stream biota.

4.3 Data Set Background Discussion

Habitat in streams is analyzed for two purposes. First, to understand the physical habitat within which biota must exist so that we can understand the biological potential of the system and second, to evaluate the physical habitat quality of the stream for the purpose of determining the potential stresses to which the biota are exposed.

4.4 Summary of Data Set Parameters

The physical habitat parameters include percentages and total counts of various in-channel and riparian features, such as substrate size,

water flow types, fish cover, channel sinuosity, riparian
vegetation types, canopy density, and proximity of human
influence features.

5.   DATA ACQUISITION AND PROCESSING METHODS

   5.1 Data Acquisition

   5.1.1 Sampling Objective

   To obtain a quantitative description of stream physical habitat for
   the during the specified sampling window.

   5.1.2 Sample Collection Methods Summary

   Quantitative habitat information was collected at eleven transects
   along each sampling reach - according to the protocols identified
   in Hayslip et al. (1994) and Klemm and Lazorchak (1994).

   5.1.3   Sampling Start Date

   May 1994
   May 1995

   5.1.4   Sampling End Date

   Oct 1994
   Sept 1995

   5.1.5   Platform

   NA

   5.1.6   Sampling Equipment

   surveyors rod, clinometer, spherical canopy densiometer, bearing
   compass, colored plastic flagging, fiberglass tape and reek (50 m
   metric), meter stick, hoop (24 inches by 24 inches with a one inch grid)

   5.1.7   Manufacturer of Sampling Equipment

   NA

   5.1.8   Key Variables

   NA

   5.1.9   Sampling Method Calibration

   See Chaloud and Peck (1994) and Hayslip et al. (1994).

5.1.10   Sample Collection Quality Control

Chaloud, D.J. and D.V. Peck. 1994. Environmental Monitoring and
Assessment Program - Surface Waters: Integrated Quality Assurance
Project Plan for the Surface Waters Resource Group, 1994 Activities.
EPA 600/X-91/080, Rev. 2.00. U.S. Environmental Protection Agency,
Office of Research and Development, Las Vegas, NV 89193.

Hayslip, G. A. (editor). 1993. EPA Region 10 In-stream Biological
Monitoring Handbook (for wadeable streams in the Pacific
Northwest). EPA-910/9-92-013. U. S. Environmental Protection
Agency - Region 10, Environmental Services Division, Seattle, WA 98101.

Merritt, G.D. 1994. Biological Assessment of wadeable Streams in the
Coast Range Ecoregion and the Yakima River Basin: Final Quality
Assurance Project Plan. Washington State Department of
Ecology, Environmental Investigations and Laboratory Services, Olympia,
WA, 15 pp.

5.1.11   Sample Collection Method Reference

Hayslip, G. A. (editor). 1993. EPA Region 10 In-stream Biological
Monitoring Handbook (for wadeable streams in the Pacific
Northwest). EPA-910/9-92-013. U. S. Environmental Protection Agency -
Region 10, Environmental Services Division, Seattle, WA 98101.

Hayslip, G., D.J. Klemm, J.M. Lazorchak. 1994. Environmental Monitoring
and Assessment Program Surface Waters and Region 10 Regional
Environmental Monitoring and Assessment Program: 1994 Pilot Field
Operations and Methods Manual for Streams on the Coast Range Ecoregion
of Oregon and Washington and the Yakima River Basin. Office of Research
and Development, U.S. Environmental Protection Agency, Cincinnati, OH.

Lazorchak, J.M., D.J. Klemm, and D.V. Peck. (editors). 1998. Environmental
Monitoring and Assessment Program - Surface Waters: Field Operations and
Methods for Measuring the Ecological Condition of Wadeable Streams.
EPA/620/R-94/004F. U.S. Environmental Protection Agency, Washington, D.C.

Kaufmann, P.R. (editor). 1993. Physical Habitat. Pages 59-69 in R.M.
Hughes, editor. Stream Indicator and Design Workshop.
EPA/600/R-93/138. U.S. Environmental Protection Agency, Corvallis, OR.

Klemm, D.J. and J.M. Lazorchak (editors). 1994. EMAP Surface Waters 1994
Streams Pilot Field Operations and Methods Manual. EPA/620/R-94/004.
U.S. Environmental Protection Agency, Office of Research and Development.

Cincinnati, OH.

5.1.12   Sample Collection Method Deviations

NA

5.2 Data Preparation and Sample Processing

5.2.1 Sample Processing Objective

See Hayslip et al. (1994) and Hayslip (1993).

5.2.2 Sample Processing Methods Summary

See Hayslip et al. (1994) and Hayslip (1993).

5.2.3 Sample Processing Method Calibration

See Hayslip et al. (1994) and Hayslip (1993).

5.2.4 Sample Processing Quality Control

See Chaloud and Peck (1994), Merritt (1994), and Hayslip (1993).

5.2.5 Sample Processing Method Reference

See Hayslip et al. (1994) and Hayslip (1993).

6. DATA MANIPULATIONS

6.1 Name of New or Modified Values

NA

6.2 Data Manipulation Description

NA

6.3 Data Manipulation Description

NA

7. DATA DESCRIPTION

7.1 Description of Parameters

#	Parameter SAS Name	Data Type	Len	Format	Parameter Label
67	DATE_COL	Num	8	DATE	Date sample Collected
69	LAT_DD	Num	8		Latitude (decimal degrees)
68	LON_DD	Num	8		Longitude (decimal degrees)
35	LSUB_DMM	Num	8		log10(est geom mean substr dia) unitless
38	MAXDEP	Num	8		maximum depth in any pool in reach in cm
16	PCAN_C	Num	8		frac of reach with coniferous dom canopy
48	PCT_BDRK	Num	8		%substrate thats rough or smooth bedrock
47	PCT_BIGR	Num	8		%substrate larger than fine gravel
63	PCT_DRS	Num	8		percent of reach with dry/submerged flow
59	PCT_FA	Num	8		percent of reach with falls

```
60   PCT_FAST   Num      8          percent of reach with fast water types
41   PCT_FN     Num      8          % of reach substrate that is fines
44   PCT_HP     Num      8          % of reach substrate that is hardpan
49   PCT_ORG    Num      8          %substrate thats wood or organic matter
62   PCT_POOL   Num      8          percent of reach with pools
43   PCT_RC     Num      8          % of reach substrate that is ??? bedrock
42   PCT_SA     Num      8          % of reach substrate that is sand
45   PCT_SAFN   Num      8          %substrate classified as sand or fines
46   PCT_SFGF   Num      8          %substrate smaller than coarse gravel
61   PCT_SLOW   Num      8          percent of reach with slow water types
40   RPA100R    Num      8          area per 100 m of reach in m^2
37   RPD75      Num      8          number of pools deeper than 75 cm
66   SAMPLED    Char     30         Site Sampled Code
54   SDDEPTH    Num      8          stdev of depth
58   SDWXD      Num      8          stdev of product: wetted width * depth
52   SINU       Num      8          ratio of dogs to crows distances
1    STRM_ID    Char     5 $        individual site identification
50   V1W_MSQ    Num      8          Volume per m2 of wet class 1 lwd
51   V4W_MSQ    Num      8          Volume per m2 of wet class 4 lwd
2    VISIT_NO   Num      8 F        visit number-within year
34   W1H_PIPE   Num      8          weighted sum of fracs of reach w pipes
33   W1H_WALL   Num      8          waited sum of fracs of reach w riprap
32   W1_HAG     Num      8          weighted sum of fracs of all ag noted
30   W1_HALL    Num      8          weighted sum of fracs of all dist. noted
31   W1_HNOAG   Num      8          weighted sum of fracs of all non-ag seen
39   XAR        Num      8          mean pool area, in m^2
6    XBKF_H     Num      8          the mean, MAXBHT
5    XBKF_W     Num      8          the mean, SUMBWID
3    XBK_A      Num      8          the mean, ANGLE
12   XC         Num      8          frac of reach covered by canopy
17   XCDENBK    Num      8          mean of %canopy cover at LF & RT banks
18   XCDENMID   Num      8          mean of %canopy cover midstream
10   XCL        Num      8          frac of reach covered by big tree canopy
15   XCMGW      Num      8          frac of reach covered by any woody veg
14   XCMW       Num      8          frac of reach covered by large woody veg
53   XDEPTH     Num      8          mean depth
65   XEMBED     Num      8          mean substrate embeddedness
19   XFC_ALG    Num      8          fraction of reach area covered by algal
27   XFC_ALL    Num      8          frac of reach area with any but algae
20   XFC_AQM    Num      8          frac of reach area covered by macrophyte
29   XFC_BIG    Num      8          frac of reach area covered by large obj.
22   XFC_BRS    Num      8          fraction of reach area covered by brush
26   XFC_HUM    Num      8          frac of reach area covered by structures
21   XFC_LWD    Num      8          fraction of reach area covered by lwd
28   XFC_NAT    Num      8          frac of reach area covered by nat. obj.
23   XFC_OHV    Num      8          frac of reach area covered by overhang
25   XFC_RCK    Num      8          frac of reach area covered by boulder
24   XFC_UCB    Num      8          frac of reach area covered by undercut
13   XG         Num      8          frac of reach covered by groundcover
11   XGB        Num      8          frac of reach without ground cover
7    XINC_H     Num      8          the mean, MAXINCIS
8    XPCM       Num      8          frac with both canopy and understory
9    XPCMG      Num      8          frac with all three veg classes present
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36  XSLOPE     Num      8           mean slope of entire reach
4   XUN        Num      8           the mean, UNDERCUT
57  XWD_RAT    Num      8           mean ratio: wetted width/depth
55  XWIDTH     Num      8           mean wetted width
56  XWXD       Num      8           mean product: wetted width * depth
64  YEAR       Num      4           Sample Year
```

7.1.1 Precision to which values are reported

Data were reported to the number of decimal places noted in 7.1.

7.1.2 Minimum Value in Data Set

```
Name       Min
------------
DATE_COL 05/16/1994
LAT_DD   42.1114
LON_DD   -124.5862217
LSUB_DMM -2.454616
MAXDEP   7.2783964164
PCAN_C   0
PCT_BDRK 0
PCT_BIGR 0
PCT_DRS  0
PCT_FA   0
PCT_FAST 0
PCT_FN   0
PCT_HP   0
PCT_ORG  0
PCT_POOL 0
PCT_RC   0
PCT_SA   0
PCT_SAFN 0
PCT_SFGF 0
PCT_SLOW 0
RPA100R  0.2256191655
RPD75    0
SDDEPTH  0
SDWXD    0
SINU     1.1143309139
V1W_MSQ  0
V4W_MSQ  0
VISIT_NO 1
W1H_PIPE 0
W1H_WALL 0
W1_HAG   0
W1_HALL  0
W1_HNOAG 0
XAR      0.0260743385
XBKF_H   0.0427272727
XBKF_W   0.8375
XBK_A    11.5
XC       0
```

```
XCDENBK   22.459893048
XCDENMID  7.2192513369
XCL       0
XCMGW     0.0166666667
XCMW      0.0125
XDEPTH    0
XEMBED    .
XFC_ALG   0
XFC_ALL   0.1045454545
XFC_AQM   0
XFC_BIG   0.0071428571
XFC_BRS   0
XFC_HUM   0
XFC_LWD   0
XFC_NAT   0.1
XFC_OHV   0
XFC_RCK   0
XFC_UCB   0
XG        0.0875
XGB       0
XINC_H    0.0833333333
XPCM      0
XPCMG     0
XSLOPE    0
XUN       0
XWD_RAT   6.0407470184
XWIDTH    0
XWXD      0
YEAR      1994
```

7.1.3 Maximum Value in Data Set

```
Name      Max
------------
DATE_COL  09/29/1995
LAT_DD    48.1784
LON_DD    -119.5619
LSUB_DMM  3.1765825636
MAXDEP    376.93
PCAN_C    1
PCT_BDRK  69.090909091
PCT_BIGR  94.545454545
PCT_DRS   100
PCT_FA    5.3333333333
PCT_FAST  98.98989899
PCT_FN    100
PCT_HP    0
PCT_ORG   30
PCT_POOL  96.644295302
PCT_RC    9.0909090909
PCT_SA    92
PCT_SAFN  100
PCT_SFGF  100
```

```
PCT_SLOW  100
RPA100R   74.120130221
RPD75     9
SDDEPTH   86.903022114
SDWXD     24.35621908
SINU      72.393163573
V1W_MSQ   4.9217079111
V4W_MSQ   2.6558486364
VISIT_NO  3
W1H_PIPE  0.5
W1H_WALL  0.75
W1_HAG    2.1111416667
W1_HALL   5.7223166667
W1_HNOAG  4.236175
XAR       32.942280098
XBKF_H    2.0447248639
XBKF_W    48.1
XBK_A     105.09090909
XC        0.9520833333
XCDENBK   100
XCDENMID  100
XCL       0.6729166667
XCMGW     1.80625
XCMW      1.5083333333
XDEPTH    139.81
XEMBED    .
XFC_ALG   0.575
XFC_ALL   1.4790909091
XFC_AQM   0.5113636364
XFC_BIG   1.0677272727
XFC_BRS   0.5477272727
XFC_HUM   0.25
XFC_LWD   0.575
XFC_NAT   1.475
XFC_OHV   0.7068181818
XFC_RCK   0.875
XFC_UCB   0.2454545455
XG        1.0854166667
XGB       0.825
XINC_H    5.3166666667
XPCM      1
XPCMG     1
XSLOPE    22.35
XUN       0.325
XWD_RAT   104.13986499
XWIDTH    30.4
XWXD      19.5288
YEAR      1995
```

7.2 Data Record Example

7.2.1 Column Names for Example Records
"DATE_COL","LAT_DD","LON_DD","LSUB_DMM","MAXDEP","PCAN_C","PCT_BDRK",
"PCT_BIGR","PCT_DRS","PCT_FA","PCT_FAST","PCT_FN","PCT_HP","PCT_ORG",
"PCT_POOL","PCT_RC","PCT_SA","PCT_SAFN","PCT_SFGF","PCT_SLOW","RPA100R",
"RPD75","SAMPLED","SDDEPTH","SDWXD","SINU","STRM_ID","V1W_MSQ","V4W_MSQ",
"VISIT_NO","W1H_PIPE","W1H_WALL","W1_HAG","W1_HALL","W1_HNOAG","XAR",
"XBKF_H","XBKF_W","XBK_A","XC","XCDENBK","XCDENMID","XCL","XCMGW","XCMW",
"XDEPTH","XEMBED","XFC_ALG","XFC_ALL","XFC_AQM","XFC_BIG","XFC_BRS",
"XFC_HUM","XFC_LWD","XFC_NAT","XFC_OHV","XFC_RCK","XFC_UCB","XG","XGB",
"XINC_H","XPCM","XPCMG","XSLOPE","XUN","XWD_RAT","XWIDTH","XWXD","YEAR"

7.2.2   Example Data Records
21JUL1995,45.991677169,-122.8964313,0.6407865652,43.342222222,0.0833333333,
0,21.818181818,16.666666667,0,30,5.4545454545,0,3.6363636364,53.333333333,
0,32.727272727,38.181818182,61.818181818,53.333333333,8.665562963,0,"Yes",
11.487031887,0.3391209578,1.5496150061,"OR001",0.0437326608,0.021025641,1,
0.0833333333,0.0833333333,0.1111166667,1.9583666667,1.84725,0.5415976852,
0.4875,3.6636363636,58.75,0.51875,98.663101604,97.994652406,0.2145833333,
1.0145833333,0.8708333333,10.966666667,.,,0,0.5340909091,0.0454545455,
0.2840909091,0.1068181818,0,0.1636363636,0.5340909091,0.1431818182,
0.0363636364,0.0840909091,0.3583333333,0.0791666667,0.6375,1,1,
1.1777777778,0.125,14.829102428,1.586,0.32432,1995

06SEP1995,45.991677169,-122.8964313,0.9006281321,46.488333333,0,0,
49.090909091,0,0,39.333333333,20,0,3.6363636364,34.666666667,0,10.909090909,
30.909090909,47.272727273,60.666666667,11.605436998,0,"Yes",12.063888466,
0.6358907051,1.5349629272,"OR001",0.1539221077,0.0868980527,2,0,0,0,
2.0834166667,2.0834166667,0.9162187103,0.6,4.6363636364,52.916666667,0.4,
98.663101604,97.058823529,0.1520833333,1.5,1.05,17.113333333,.,,0,
0.7363636364,0,0.1431818182,0.1,0,0.0795454545,0.7363636364,0.4931818182,
0.0318181818,0.0318181818,0.9708333333,0.05,0.8416666667,1,1,1.1944444444,
0.0333333333,17.199603175,2.91,0.8141,1995

14SEP1995,44.138895486,-123.4394569,-0.64440256,139.04444444,0.0833333333,
0,9.0909090909,0,0,36,29.090909091,0,10.909090909,20,0,7.2727272727,
36.363636364,36.363636364,64,14.230959084,1,"Yes",28.876959464,2.5034777699,
1.1648259585,"OR003",0.0063096276,0.0039219493,1,0,0,0,0.3055666667,
0.3055666667,3.5577397711,0.975,15.881818182,41.25,0.73125,94.411764706,
65.77540107,0.3791666667,1.3583333333,1.225,33.4,.,,0,0.3818181818,
0.0590909091,0.1659090909,0.1340909091,0,0.1295454545,0.3818181818,
0.0818181818,0.0227272727,0.0136363636,0.80625,0.025,1.85,1,1,1.1111111111,
0.05,65.947389447,12.62,3.7915,1995

8.   GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-124 Degrees 35 Minutes 10 Seconds West (-124.5862217 Decimal Degrees)

   8.2 Maximum Longitude

      -119 Degrees 33 Minutes 42 Seconds West (-119.5619 Decimal Degrees)

   8.3 Minimum Latitude

      42 Degrees 6 Minutes 41 Seconds North (42.1114 Decimal Degrees)

   8.4 Maximum Latitude

      48 Degrees 10 Minutes 42 Seconds North (48.1784 Decimal Degrees)

   8.5 Name of Area or Region

      EPA Region 10
      The sampling area included the Coast Range Ecoregion and the Yakima
      River Basin (Columbia Basin Ecoregion).

9.   QUALITY CONTROL / QUALITY ASSURANCE

   9.1 Data Quality Objectives

      See Chaloud and Peck (1994), Merritt (1994), and Hayslip (1993).

   9.2 Quality Assurance Procedures

      See Chaloud and Peck (1994), Merritt (1994), and Hayslip (1993).

   9.3 Unassessed Errors

      NA

10. DATA ACCESS

   10.1 Data Access Procedures

      Data can be downloaded from the WWW site or contact personnel listed in
      Section 10.3.

   10.2 Data Access Restrictions

      Data can only be accessed from the WWW server.

10.3 Data Access Contact Persons

Gretchen Hayslip
Environmental Services Division
Region 10
U.S. Environmental Protection Agency
1200 Sixth Avenue, ES-097
Seattle, WA 98101
206-553-1685
206-553-0119 (FAX)
hayslip.gretchen@epamail.epa.gov

Data Librarian EMAP-Information Management
U.S. EPA NHEERL-AED
401-782-3184
401-782-3030 (FAX)
hughes.melissa@epa.gov

10.4 Data Set Format

Data files are in ASCII comma-delimited format.

10.5 Information Concerning Anonymous FTP

Data cannot be accessed via ftp.

10.6 Information Concerning WWW

Data can be downloaded from the WWW site.

10.7 EMAP CD-ROM Containing the Data

Data are not available on CD-ROM.

11. REFERENCES

Chaloud, D.J. and D.V. Peck. 1994. Environmental Monitoring and
Assessment Program - Surface Waters: Integrated Quality Assurance
Project Plan for the Surface Waters Resource Group, 1994 Activities.
EPA 600/X-91/080, Rev. 2.00. U.S. Environmental Protection Agency,
Office of Research and Development, Las Vegas, NV 89193.

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Agency - Region 10, Environmental Services Division, Seattle, WA 98101.

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and Assessment Program Surface Waters and Region 10 Regional
Environmental Monitoring and Assessment Program: 1994 Pilot Field
Operations and Methods Manual for Streams on the Coast Range Ecoregion
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Lazorchak, J.M., D.J. Klemm, and D.V. Peck. (editors). 1998. Environmental Monitoring and Assessment Program - Surface Waters: Field Operations and Methods for Measuring the Ecological Condition of Wadeable Streams. EPA/620/R-94/004F. U.S. Environmental Protection Agency, Washington, D.C.

Merritt, G.D. 1994. Biological Assessment of wadeable Streams in the Coast Range Ecoregion and the Yakima River Basin: Final Quality Assurance Project Plan. Washington State Department of Ecology, Environmental Investigations and Laboratory Services, Olympia, WA, 15 pp.

12. **TABLE OF ACRONYMS**

13. **PERSONNEL INFORMATION**

Project Manager
  Gretchen Hayslip
  Environmental Services Division
  Region 10
  U.S. Environmental Protection Agency
  1200 Sixth Avenue, ES-097
  Seattle, WA 98101
  206-553-1685
  206-553-0119 (FAX)
  hayslip.gretchen@epamail.epa.gov

R-EMAP Project Leader for Washington State
  Glenn Merritt
  Washington State Department of Ecology
  Watershed Assessments Section
  300 Desmond Drive, P.O. Box 47710
  Olympia, WA 98504-7710
  206-407-6777
  206-407-6884 (FAX)

R-EMAP Project Leader for Oregon
  Rick Hafele
  Oregon Department of Environmental Quality
  811 SW 6th Avenue
  Portland, OR 97204-1390
  503-229-5983
  503-229-6124 (FAX)
  rick.hafele@state.or.us

Quality Assurance Officer
  Dave Peck
  U.S. Environmental Protection Agency
  NHEERL Western Ecology Division
  200 S.W. 35th Street
  Corvallis, OR 97333
  541-754-4426
  541-754-4716(FAX)
  davep@mail.cor.epa.gov

Information Management, EMAP-Surface Waters
  Marlys Cappaert
  OAO c/o U.S. Environmental Protection Agency
  NHEERL Western Ecology Division
  200 S.W. 35th Street
  Corvallis, OR 97333
  541-754-4467
  541-754-4716(FAX)
  cappaert@mail.cor.epa.gov